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AUTHOR Stitleman, Leonard
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ABSTRACT

Cost Utility Analysis (CUA) is, basically, an administrative tool to be used in situations where making a choice among meaningful programs is necessary. It does not replace the administrator, but can provide a significant source of data for the decision maker. CUA can be a guide to the selection of an optimal program in terms of available funds, personnel, and facilities so that the best allocation of resources at your disposal can be made. It is another attempt to relate the resources or funds to the goals or objectives of an organization. However, in CUA, the emphasis is on quantification and precise measures, and draws upon the analytical tools of many disciplines, such as mathematics, operations research, and computer science. The limitations and disadvantages of CUA are summarized. In spite of the problems and limitations of the CUA aspect of PPBS, it can be extremely valuable when used properly. The results of any analysis can only be as reliable as the data on which the system is based. (NH)

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Cost Utility Analysis Applied to Library Budgeting

by

Leonard Stitleman, Assistant Chairman
Department of Political Science
Wayne State University

Paper presented at an Institute on Program Planning and Budgeting Systems for Libraries at Wayne State University, Detroit, Michigan, Department of Library Science, Spring 1968

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Introduction

by
Genevieve Casey
Associate Professor, Library Science, Wayne State University

The following paper was presented at an institute on Program Planning and Budgeting Systems for Libraries, held at Wayne State University under the Higher Education Act, Title IIB, in the spring of 1968.

The intent of the institute was to introduce administrators and finance officers of large libraries, public, state, and academic to the principles and procedures of PPBS.

Each participant in the institute brought with him the most recent budget document from his own library, and with the help of the institute staff, attempted to convert it into a PPBS presentation.

Cost Utility Analysis Applied to Library Budgeting

by
Leonard Stitelman, Assistant Chairman
Department of Political Science
Wayne State University

One of the highlights of the general subject of this Institute - Program Planning Budgeting Systems - is that portion referred to as Cost Unility Analysis (CUA). Because of its recent development, the experts have not agreed as to its standard designation. This is apparent when one finds other phrases to identify it, such as Cost Benefit Analysis of the Cost Effectiveness Approach. Although some writers attempt to distinguish these appellations, we will consider them as equal and interchangeable for this Institute.

I also wish to fram my remarks in terms of my attitude toward CUA, PPBS, and any other recent management tool -- I present CUA not to extol it, but to evaluate it critically, It is not the final solution to anything, but is worth your time and effort in understanding it as a useful technique in library administration.

It is essential that we not allow ourselves to be overawed by these quantitative analysis methods. At times, they call for a "put-down". One of the most effective squelches I have seen was authored by Admiral Hyman G. Rickover, who reacted as follows to an Atomic Energy Commission document:

> This will acknowledge receipt of your memorandum and attachment dated Jan. 26, 1968, requesting my review and comments on your Guide for the Preparation of Special Analytical Studies. I have spent much time reading this document; unfortunately, I cannot understand it. Its statements on how to conduct Special Analytical Studies sound extremely impressive - these statements include many large and unusual words in complex syntax and obviously are the work of an intellectual. However, many such statements are beyond my comprehension; for example:

"The concept of a parallel internal list of topics in addition to those which are specifically identified for near-term submission to the BOB recognizes an Agency need or interest for initiation of study activity in areas in which it is not clear prior to completion that discussion with BOB will be warranted, or which may represent possible early phase of more studies later or which may require an extended period for completion."

As you know, my training is in engineering and not in analysis and is thus deficient to enable me to understand your Buide. I asked several of my leading engineers and scientists to help me, but they also found your Guide beyond their comprehension. My conclusion is that we in Naval Reactors are not sufficiently sophisticated to understand it; in order to ascertain if your Guide has any practical use, it would first have to be rewritten in simple English, that is, in language we "plumbers" in Naval Reactors could understand.

Accordingly, I have deposited your Guide in my special file. When and if you rewrite it in a form I am able to understand and when and if my "analytical staff" finishes his present "analytical counteranalyses", does some of his technical work and has the time to analyze your Guide, I will provide you my comments, if any.

Hopefully, we can examine the cost-utility analysis concept with the same clarity that Admiral Rickover brings to bear in his evaluations. CUA is, basically, an administrative tool to be used in situations where making a choice among meaningful programs is necessary. It does not replace the administrator, but can provide a significant source of data for the decision maker.

CUA can be a guide to the selection of an optimal program in terms of available funds, personnel, and facilities so that the best allocation of resources at your disposal can be made. It is another attempt to relate the resources or funds to the goals or objectives of an organization. However, in CUA, the emphasis is on quantification and precise measures, and draws upon the analytical tools of many disciplines, such as mathematics, operations

research, and computer science. It includes both immediate and long range costs, and all benefits and costs are analyzed, including side effects and external impact. Thus, this information is then related to political, psychological, and other subjects not included in the CUA.

If we think of CUA as attempting to lessen the level of uncertainty in management decision making, and not as achieving scientific decision making, we can readily accept the limitations which will be discussed laterin the paper. Also, CUA is not intended to measure the efficiency of the administrative organization of an ongoing library. The evaluation of daily operational performance is important, but is not the focus of CUA.

Now let us turn to the federal government's general approach to CUA, which they label as "Multi-year Program and Financial Plan" (PFP). The PFP presents data on the outputs, cost, and financing of agency programs. Using charts, it shows the future implications of current decisions for at least a five-year projection. It does not include possible future programs which have not been recommended nor program-level changes which may occur in the future, since these are not part of the current budget cycle. The agencies are encouraged to develop alternative programs, policies, costs, and outputs for the coming five years, but the PFP is designed only as a statement for executive decision making which includes the present and future budget and output results of the current year's decisions.

The agency, however, does include long-range program strategy and alternatives in the Program Memoranda, which is a document of no more than 20 pages showing what choices have been made, and why these choices were made. It is prepared annually for each program in the agency.

In the Output section of the PFP, a quantitative measure of end products or services of a particular program are presented. These outputs are the best measure of what is produced by that program. The Bureau of the Budget recognizes that it may not be possible for an agency to find one clear quantifiable output to meet the decision-making needs of the executive, but it does require some kinds of measures of effectiveness. For a recreation program, for example, the best output guide might be to relate costs to the capacity of the recreation facilities, but the use of the facilities would be the best measure of meeting the objectives of the program.

In the Costs section of the PFP, there is a statement of financial requirements in terms of program costs for the activities. Where the costs come from other government agencies. the private sector, or other sources, these are identified and included in this section of the PFP.

Let us look more closely at the "cost" part of CUA with specific examples and situations relevant to the library administration environment. A concrete example of cost analysis is found in a Department of Health, Education and Welfare study of government programs designed to reduce injuries and deaths from traffic accidents. Three of the nine programs studies are relatively "low cost", "projected 1968-1972 expenditures of $2 million or less per program); four are "moderate cost" (1968-1972 expenditures of over $5 million, but less than $30 million per program); the remaining two programs are relatively "high cost" (over $700 million each).

The three low-cost programs are designed to:

(a) increase seat belt use,

(b) improve restraint systems, and

(c) reduce pedestrian injury

The four moderate-cost programs have as their goals:

(a) increased use of protective devices by motorcyclists,

(b) upgrading of the driving environment,

(c) reduction of driver drinking, and

(d) improvement of driver licensing.

The high-cost programs are concerned with:

(a) better driver training, and

(b) better medical service.

The savings produced by these programs relate to the measurement of estimated reduced medical expenses and lost income in traffic injuries, and to the capitalized future earnings where deaths occur.

The study demonstrated that there were very wide variations in dollar savings among these programs. The largest savings, over $1,000 per dollar of program cost, are the result of two of the three least expensive programs, and the smallest savings, about $3, relates to the two most expensive programs.

Here is another example of the "cost" aspect of CUA as adopted by the United States Information Agency. Cost-analysis applications should compare inputs to outputs, and the USIA has developed very interesting measurements. The agency has an obvious information function, and its experience may have a significant meaning for the comestic library service. The unit of output created by USIA is an "exposure", which is defined as "one time one person is reached by an Agency product, employee, or institution." The agency has also varying levels of exposures based on media comparisons. They attempt to reflect qualitative differences between such media

quality using such measures as "persuasiveness," "depth of impact", "timeliness," and "redibility."

In terms of its limited funds, USIA has not generally aimed its information programs at a mass audience, but has concentrated on leaders and molders of public opinion. On the rare occasions when a mass medium is used, they recognize that some listeners or viewers are not part of the target groups. These are identified as the "spillover audience." The basic analysis involves the exposures secured among the target-group persons, and the cost quality of these exposures as contrasted with other means of achieving the same exposures. However, the "spillover exposures" are also considered to be valuable as at least likely to help create sympathy for the position of the United States.

Now, if we broaden the "cost" factor to "monetary criteria," the effects of program alternatives can be of many types. In a study printed by the U.S. Senate Government Operations Committee, July 21, 1967, the effects of dollar costs are described as including the following elements:

1. Program costs. These include directly incurred government costs in undertaking the program activities, such as administrative and other support-type costs.

2. Program monetary effects within the government. Program costs in other government agencies may be increased or decreased as a result of a particular program. For example an urban renewal project might reduce the level of police and fire services, but increase the demand for park and recreation programs, and affect the assesed valuation rate.

3. Program monetary effects outside the government. Many government programs have a major impact on the private sector. Housing, highway,

welfare, or mass-transportation projects can have a considerable effect on business and other activities, e.g. religious groups. Other government activities can directly affect almost every citizen -- the whole field of insurance is a prime example.

The point here is that cost or monetary analyses should consider these overall impacts so that all elements of significance are reviewed for the decision maker.

Let us shift to the "utility" or "benefit" aspect of cost utility analyses. Remember that we are selecting from among alternatives, so that we must compare the benefits of spending resources in different ways. The library administrator can be presented with a wide variety of quantitative data. I don't think that library services can be approached in terms of one measure of benefits, but the decision maker might be able to determine whether library services would improve or not, depending on various alternative programs.

Again, we must remember that even if a significant benefit can not be quantified, it should be included in the analysis, at least in terms of being mentioned as nonquantifiable. Thus, the library administrator can be aware of the problem. The issue of a junior college program's relationship to meeting the criteria of aid to higher education is an example.

Determining the benefit of a proposed program in terms of alternatives may be a more difficult problem than evaluating a proposed missile's relationship to the general goal of strategic retaliation. At the federal government level, there are more than 40 agencies and bureaus spending funds on education, and local governments are the primary source of funds for junior college education. We also recognize that the decision may be seriously affected by

social, economic, and political aspects relating to unemployment among young people. Thus, the benefits of such a proposal must be evaluated not only with the consideration of income improvement accruing to students in mind, but with the whole perspective of teenage unemployment.

If there is no agreement on basic objectives, there can be very serious problems. The current conflict over the giant redwoods in California is an example of this situation, in which the lumber industry is pitted against the conservationists. Obviously, most of the benefits are difficult if not impossible to quantify, which makes the resolution of the issue a real problem.

And what about services of particular significance in libraries -- courtesy and a quiet and pleasant environment. These are directly related to the evaluation of the service in terms of quality. Although CUA does not take into account the ongoing performance level, these factors must be considered in terms of program planning, and the problems of quantifying the benefits are faced by the administrator.

Change and Cost Analysis

The element of change in the nature of a service can be easily overlooked when analyzing benefits. A rapid transportation system today is not comparable to that of a generation ago. Population change, a major factor in library services, does not usually show a one-to-one relationship to increased use. Studies have shown that expenditures generally rise more in proportion than an increase in population.

Another change factor is the user charge. If fines on overdue books double, it does not follow that receipts will double. When a community has a significant change in per-capita income, the demands for library service will

be affected. There are additional factors affecting benefit estimates, but these servie to make the administrator more aware of the change factor.

Thus, it is obvious that many practical benefits involving ethical, so=cial, esthetic, and political factors will have to be evaluated as value judg-ments. But the library administrator should not hide these values behind data and technical language. We have looked closely at the "cost" and "utility" elements of cost-utility analysis; now, using the third word of the phrase, let us analyze some advantages and disadvantages of the technique.

Advantages of Cost Utility Analysis

Most writers agree with Gene Fisher's comment in Program Budgeting that "we visualize cost-utility analysis as playing a somewhat modest, though very significant, role in the over-all decision-making process." Because this subject is covered in detail in another paper, I will summarize the more im-portant advantages for library administrators.

1. Some library management decisions previously based on implied judgments are brought into the open, and for the first time, subjected to a critical analysis and evaluation.

2. CUA gives the responsible library official a basis for rejecting popular projects, which can be justified to the public. It makes you less ar-bitrary and more rational in terms of a public orientation.

3. Discussions can move toward reality and away from simple state-ments of the noble purpose of a library system.

4. The analysis is focused on output of library services, not input.

5. CUA takes into account the long range cost implications of library management decisions.

6. CUA forces the library administrator to consider possible alternative programs which might not otherwise be formulated.

Limitations of Cost Utility Analysis

Even its advocates admit that CUA has limitations and disadvantages. These can be summarized as follows:

1. There are problems in defining meaningful and specific objectives, even in the area of library service programs.

2. There are glaring inadequacies in the available historical information, and this in turn can limit the value of estimates on various alternative library programs. We are never positive that all relevant data were considered.

3. There is a tendency to evaluate costs and benefits for a single point in time, where as effective cost-utility analysis requires a time frame analysis of possible five to ten years.

4. Alternative library programs can have multiple and noncomparable benefits.

5. The public library system in the United States is not under centralized control in the sense that the military system is under the Department of Defense. A cost-utility analysis of a military project can relate to a meaningful national program, but the effectiveness of a library project at the local level can not relate to a comparable national program.

6. The decision maker might make undue emphasis on monetary costs as his prime yardstick of evaluation.

7. There is a tendency to quantify factors which should not be quantified due to an excessive desire for "objectivity." Some analysts think that numbers remove bias in the evaluation. There are many human factors and in-

tangibles in public library programs which should not be reduced to numerical factors.

8. There is no doubt that cost-utility analysis is a lengthy and detailed process which should not be approached on a "crash" basis. There is very great danger that hasty analysis in response to a deacline can do more harm than good to library services.

9. We must not expect cost-utility analysis to make the cidisions for the library administrator. CUA is only a portion of the essential input for judicious decision making.

In Conclusion

It now becomes apparent that it is easier to describe cost-utility analysis as a concept than it is to put it into practice. We can also agree that some measurements are better than none, particularly when the advantages and limitations of CUA are understood by the library administrator.

What we have seen in governments at all levels in the past three years is the explosive application of a concept (not new by any means) in the military function of the federal government ot nonmilitary but governmental programs. I view the major admustments and modifications of this development as the "growing pains stage" which is preliminary to a more mature and helpful form of cost utility analysis in field such as library administration.

In our criticism of the present state of CUA, we must not lose sight of the fact that we now readily accept the necessity to change from an ad hoc, seat-of-the-pants approach steeped in intuition to in-depth, substantive analysis supported by experience and intuition. We are really attempting to make the library administrator's judgment and intuition more effective throught the

use of quantified measures.

Remember that CUA can actually make your job more difficult through the provision of additional alternatives and data for decision making. The policy impact of CUA is on the future, and experimentation in the present is not possible.

Although I have pointed out the problems and limitations of the CUA aspect of PPBS, I still maintain that it can be extremely valuable when it is used properly. The results of any analysis can only be as reliable as the data on which the system is based (remember the standard warning with regard to computer data - garbage in, garbage out). All of these "modern" and powerful devices can only aid but never substitue for the judgment of the experienced library administrator -- you!

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